

Transcript of U.S. Geological Survey Open-File Report 2009-1067, Three short videos by the Yellowstone Volcano Observatory, video 2, 'Yellowstone Volcano Observatory'

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[graphic of logo: USGS, science for a changing world]

Yellowstone Volcano Observatory

An unscripted interview, January 2009, 7:15 Minutes

[video of geologist standing in front of a large geologic map of Yellowstone while he talks to the camera and points out features on the map]

I'm Jake Lowenstern of the U.S. Geological Survey and I'm Scientist-in-Charge of the Yellowstone Volcano Observatory. Today we're going to talk about the Yellowstone Volcano Observatory—what it does, who makes it up, and what we do, what are the monitoring techniques that we use to look at volcanic activity at Yellowstone.

The Yellowstone Volcano Observatory is a virtual observatory. There is no building. We're a partnership of three different organizations. There's the USGS, my organization, which runs the volcano observatories; then there's the University of Utah, and they run the seismic and ground deformation networks and are doing the geophysics that are involved in volcano monitoring; and finally, we have the land manager Yellowstone National Park, and they're a group of scientists who are out looking at the hydrothermal activity and other geologic activity at Yellowstone.

How do you monitor volcanic activity at Yellowstone?

The main systems that we use for monitoring at Yellowstone are the seismic and the GPS ground deformation systems. The seismic system is about 27 different seismic stations, spread out all over Yellowstone and they allow us to look at the size of earthquakes, the timing of earthquakes, and the magnitude, how big they are, how much energy they release. Beyond that, we have GPS stations and the GPS stations are on very fixed monuments that are put into the ground and they're averaging their location over many many days and are taking data constantly and that allows us to get very precise locations and to see how any spot on the ground is moving over time. As a result of having this technique, we can see that the ground at Yellowstone, for example in this area right here, has moved about 20 centimeters or something around 12 inches upwards over the last 4.5 years.

How are satellites used to study deformation?

We have two primary methods of looking at ground deformation. One we've already talked about uses satellites and the GPS system and there we can look at one point in space and one point on the ground and see how it moves over time.

We have another technique that allows us to look at all of the ground surface at the same time and that's called INSAR or Interferometric Synthetic Aperture Radar. In this case, you get two radar images that are taken maybe a year apart, and you can't see what happened over that year, but you can see the amount of movement everywhere within the park over that one year time shift.

Do you monitor the geysers or any other aspect of the Park?

We do look at geysers as well at some locations, but we don't have the data in real time, instead, we have data loggers which show the temperature of different stream outlets and geyser outflows and pool temperatures and we can go collect that data and put it in an archive and look at the changes of temperature of different features over time.

Another thing that we have is the park has contracted with various different university groups to fly over Yellowstone and take thermal images of the park and what they're trying to do with those thermal images is look at how the park changes over time and see if some of the thermal locations are shrinking and other ones are growing.

Swarms of earthquakes & ground deformation at Yellowstone

Ever since people started coming to Yellowstone, there have been lots of earthquakes. And ever since we started putting up a seismic network, we've seen that there's swarms. Sometimes there's a swarm every few months somewhere in the park. The biggest one that we know of was in 1985. There's been smaller ones since then.

Also we know that there's been ground moving up and down over time. Between the 1920s and the 1970s, there was a shift in Yellowstone Lake and that caused areas in the south to be drowned and there were about 80 centimeters of upward movement of the caldera floor up in this region. And so we know there's been this kind of activity. When people have looked at lake levels in the past, they've seen over the past 10,000 years there's even bigger uplifts and downwarps that have been occurring at Yellowstone. So this clearly is the kind of activity that is always happening at Yellowstone. You go around calderas at other places in the world and we can even find more extreme examples of ground deformation, of swarms, also without any volcanic activity. So in general, any time we see a swarm or we see a bit of ground deformation, we don't necessarily think that this is indicating a volcanic eruption. There's a lot of things that go on at Yellowstone. It's an active place. That's what makes it so special. We don't necessarily tie every single anomalous bit of activity into a volcanic eruption.

Why is YVO a relatively small group?

So YVO includes a couple different people working from the U.S. Geological Survey, a couple people working at Yellowstone National Park, and a group of people working at the University of Utah on the geophysical data, the seismic and GPS data. In general, it's a relatively small operation, because there's a lot of volcanoes in the United States. We have well over a hundred that have erupted in the last 10,000 years and so there's a lot of

activity to watch. In Alaska, there are about 80 different volcanoes and probably about a quarter of them have erupted in the last 50-100 years. So there's a lot that we need to look out for. Yellowstone is an important part of the volcano program, but it's not the only part and so we also need to make sure that we have people out looking at the Cascades volcanoes in Washington, Oregon, and California, at the Long Valley Observatory also in California, and then in Alaska and Hawaii.

More Information

If you go to our Web site, which is volcanoes.usgs.gov/yvo, you'll see that we put out a monthly update and that update summarizes everything that we've seen in terms of the ground deformation, in terms of earthquakes over that monthly period. Anytime anything else happens, there might be a hydrothermal explosion, there's a swarm of earthquakes, there's maybe faster ground motion, we'll put out an information release and that information release will also get put right there on the front page of our Web site and will provide information on what's happening right now. That all goes into an archive so you can look back at the last six months or nine months or eventually many many years of information releases and monthly updates and get a view of what's been happening at Yellowstone over time.

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Featuring Jake Lowenstern, Scientist-in-Charge, Yellowstone Volcano Observatory

Produced by Stephen Wessells

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For additional information:
<http://volcanoes.usgs.gov>
<http://volcanoes.usgs.gov/yvo/>

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